

1 **CLAIMS:**

2 What is claimed, is:

3 (1) A compiler apparatus for optimizing exception handling in a target program as a
4 program to be compiled, comprising:

5 an exception handler detection section for detecting, from exception handlers that catch
6 exceptions thrown in said target program, a multiple-catching exception handler that
7 catches a plurality of different exceptions and rethrow the caught exceptions;

8 an exception selection section for selecting a set of exceptions that are to be shifted to
9 common processing through rethrow of the exception by said multiple-catching exception
10 handler from among said plurality of exceptions caught by said multiple-catching
11 exception handler detected; and

12 an exception handler throw section for throwing a clone exception handler that catches
13 the set of exceptions selected by said exception selection section instead of said
14 multiple-catching exception handler and shifting it to said common processing.

15 (2) The compiler apparatus according to Claim 1, wherein said exception handler throw
16 section throws a branch instruction for causing a shift to said common processing in said
17 clone exception handler and causes a shift to said common processing with said branch
18 instruction thrown.

19 (3) The compiler apparatus according to Claim 1, wherein said exception selection
20 section selects a set of exceptions whose frequency of throw in said multiple-catching
21 exception handler is more than a predetermined reference frequency and which is shifted
22 to said common processing.

1 (4) The compiler apparatus according to Claim 3, wherein, as a frequency with which
2 exceptions are thrown in said multiple-catching exception handler, said exception
3 selection section detects the number of times that any of said set of exceptions is thrown
4 in said multiple-catching exception handler per the number of execution of said
5 multiple-catching exception handler.

6 (5) The compiler apparatus according to Claim 1, wherein
7 said common processing includes catching exceptions that are thrown while processing a
8 function that has been called with a function call outside said function call;
9 said multiple-catching exception handler catches exceptions inside said function call; and
10 said exception selection section selects said set of exceptions further on condition that
11 depth of nesting of function call from said common processing down to said
12 multiple-catching exception handler is more than a predetermined number.

13 (6) The compiler apparatus according to Claim 1, wherein the exception selection
14 section selects the set of exceptions further on condition that the number of other
15 exception handlers through which processing shifts from the multiple-catching exception
16 handler to the common processing is more than a predetermined number.

17 (7) The compiler apparatus according to Claim 1, wherein
18 said common processing includes catching exceptions that are thrown while processing a
19 function that has been called with a function call outside said function call;
20 said multiple-catching exception handler catches exceptions inside said function call; and
21 said exception selection section selects said set of exceptions further based on depth of

1 nesting of function call from said common processing down to said multiple-catching
2 exception handler and the number of other exception handlers through which processing
3 shifts from said multiple-catching exception handler to said common processing.

4 (8) The compiler apparatus according to Claim 1, wherein

5 said exception handler detection section detects two said multiple-catching exception
6 handlers: one said multiple-catching exception handler and another said multiple-catching
7 exception handler for catching at least one exception thrown in said one multiple-catching
8 exception handler;

9 said exception selection section selects a set of exceptions to be shifted to said common
10 processing by rethrowing an exception caught in said another multiple-catching exception
11 handler from among a plurality of exceptions caught by said one multiple-catching
12 exception handler; and

13 said exception handler throw section throws each of two said clone exception handlers
14 that correspond to each of said two multiple-catching exception handlers and causes each
15 of said corresponding two clone exception handlers to catch the set of exceptions selected
16 by said exception selection section instead of each of said two multiple-catching
17 exception handlers.

18 (9) A compiler program for causing a computer to function as a compiler apparatus that
19 optimizes exception handling in a target program as a program to be compiled, said
20 compiler program causing said computer to function as

21 an exception handler detection section for detecting, from exception handlers that catch
22 exceptions thrown in said target program, a multiple-catching exception handler that
23 catches a plurality of different exceptions and rethrow the caught exceptions;

1 an exception selection section for selecting a set of exceptions that are to be shifted to
2 common processing through rethrow of the exceptions by the multiple-catching exception
3 handler from among said plurality of exceptions caught by said multiple-catching
4 exception handler detected; and

5 an exception handler throw section for throwing a clone exception handler that catches
6 the set of exceptions selected by said exception selection section instead of said
7 multiple-catching exception handler and shifting it to said common processing.

8 (10) The compiler program according to Claim 9, wherein

9 said common processing includes catching exceptions that are thrown while processing a
10 function that has been called with a function call outside said function call;

11 said multiple-catching exception handler catches exceptions inside said function call; and

12 said exception selection section selects said set of exceptions further based on depth of
13 nesting of function call from said common processing down to said multiple-catching
14 exception handler and the number of other exception handlers through which processing
15 shifts from said multiple-catching exception handler to said common processing.

16 (11) The compiler program according to Claim 9, wherein

17 said exception handler detection section detects two said multiple-catching exception
18 handlers: one said multiple-catching exception handler and another said multiple-catching
19 exception handler for catching at least one exception thrown in said one multiple-catching
20 exception handler;

21 said exception selection section selects a set of exceptions to be shifted to said common
22 processing by rethrowing an exception caught in said another multiple-catching exception

- 1 handler from among a plurality of exceptions caught by said one multiple-catching
2 exception handler; and
- 3 said exception handler throw section throws each of two said clone exception handlers
4 that correspond to each of said two multiple-catching exception handlers and causes each
5 of said corresponding two clone exception handlers to catch the set of exceptions selected
6 by said exception selection section instead of each of said two multiple-catching
7 exception handlers.
- 8 (12) A recording medium having the compiler program according to Claim 11 recorded
9 thereon.
- 10 (13) A compiling method for causing a computer to operate as a compiler apparatus that
11 optimizes exception handling in a target program as a program to be compiled,
12 comprising:
- 13 detecting, from exception handlers that catch exceptions thrown in said target program;
- 14 catching a plurality of different exceptions and rethrowing the caught exceptions;
- 15 selecting a set of exceptions that are to be shifted to common processing through rethrow
16 of the exceptions from among said plurality of exceptions caught; and
- 17 throwing a clone exception handler catching the set of exceptions selected by said step of
18 selecting; and
- 19 shifting the set of exceptions to said common processing.
- 20 (14) An article of manufacture comprising a computer usable medium having computer
21 readable program code means embodied therein for causing optimization of exception

1 handling in a target program as a program to be compiled, the computer readable program
2 code means in said article of manufacture comprising computer readable program code
3 means for causing a computer to effect the steps of claim 13.

4 (15) A program storage device readable by machine, tangibly embodying a program of
5 instructions executable by the machine to perform method steps for optimizing exception
6 handling in a target program as a program to be compiled, said method steps comprising
7 the steps of claim 13.

8 (16) A computer program product comprising a computer usable medium having
9 computer readable program code means embodied therein for causing optimization of
10 exception handling in a target program as a program to be compiled, the computer
11 readable program code means in said computer program product comprising computer
12 readable program code means for causing a computer to effect the functions of claim 1.